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UNDERSTANDING THE DISTANCE BETWEEN TWO POINTS IN A COORDINATE PLANE IS A FUNDAMENTAL CONCEPT IN MATHEMATICS, ESPECIALLY IN THE FIELDS OF GEOMETRY, ALGEBRA, AND ANALYTIC GEOMETRY. WHETHER YOU'RE A STUDENT PREPARING FOR AN EXAM, A TEACHER DESIGNING LESSON PLANS, OR AN ENTHUSIAST EXPLORING THE GEOMETRIC RELATIONSHIPS WITHIN CARTESIAN COORDINATES, MASTERING HOW TO FIND THE DISTANCE BETWEEN POINTS IS AN ESSENTIAL SKILL.

IN THIS ARTICLE, WE WILL EXPLORE THE PROCESS OF CALCULATING THE DISTANCE BETWEEN TWO SPECIFIC POINTS, A = (2, 0) AND B = (0, 9). WE WILL WALK THROUGH THE FORMULA, PROVIDE STEP-BY-STEP CALCULATIONS, AND DISCUSS PRACTICAL APPLICATIONS. BY THE END, YOU'LL BE COMFORTABLE APPLYING THIS METHOD TO ANY PAIR OF POINTS IN THE COORDINATE PLANE, ROUNDED TO THE NEAREST TENTH AS REQUIRED.

UNDERSTANDING THE COORDINATE PLANE AND POINTS

BEFORE DIVING INTO THE CALCULATION, IT'S CRUCIAL TO UNDERSTAND THE BASIC COMPONENTS INVOLVED:

- COORDINATE PLANE: A TWO-DIMENSIONAL PLANE WITH HORIZONTAL (X-AXIS) AND VERTICAL (Y-AXIS) AXES INTERSECTING AT THE ORIGIN (0,0).
- POINTS IN THE PLANE: DEFINED BY ORDERED PAIRS (X, Y), WHERE 'X' INDICATES THE POSITION ALONG THE HORIZONTAL AXIS AND 'Y' ALONG THE VERTICAL AXIS.

IN OUR CASE, WE ARE GIVEN TWO POINTS:

- POINT A = (2, 0)
- POINT B = (0, 9)

THESE POINTS ARE LOCATED ON THE COORDINATE PLANE AT SPECIFIC POSITIONS RELATIVE TO THE ORIGIN.

THE DISTANCE FORMULA IN THE COORDINATE PLANE

THE DISTANCE BETWEEN ANY TWO POINTS IN THE COORDINATE PLANE CAN BE CALCULATED USING THE DISTANCE FORMULA, WHICH IS DERIVED FROM THE PYTHAGOREAN THEOREM.

DISTANCE FORMULA:

$$[D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}]$$

WHERE:

- $((x_1, y_1))$ ARE THE COORDINATES OF THE FIRST POINT.
- $((x_2, y_2))$ ARE THE COORDINATES OF THE SECOND POINT.
- (D) IS THE DISTANCE BETWEEN THE TWO POINTS.

THIS FORMULA CALCULATES THE LENGTH OF THE HYPOTENUSE OF A RIGHT TRIANGLE FORMED BY THE HORIZONTAL AND VERTICAL DIFFERENCES BETWEEN THE POINTS.

STEP-BY-STEP CALCULATION OF THE DISTANCE BETWEEN POINTS A AND B

LET'S APPLY THE DISTANCE FORMULA TO POINTS $A = (2, 0)$ AND $B = (0, 9)$:

STEP 1: IDENTIFY THE COORDINATES

- $(x_1 = 2), (y_1 = 0)$
- $(x_2 = 0), (y_2 = 9)$

STEP 2: CALCULATE THE DIFFERENCES

- HORIZONTAL DIFFERENCE: $(x_2 - x_1 = 0 - 2 = -2)$
- VERTICAL DIFFERENCE: $(y_2 - y_1 = 9 - 0 = 9)$

STEP 3: SQUARE THE DIFFERENCES

- $(-2)^2 = 4$
- $(9)^2 = 81$

STEP 4: SUM THE SQUARES

- $(4 + 81 = 85)$

STEP 5: TAKE THE SQUARE ROOT

- $(d = \sqrt{85})$

STEP 6: CALCULATE THE SQUARE ROOT

USING A CALCULATOR:

- $(\sqrt{85} \approx 9.219544)$

STEP 7: ROUND TO THE NEAREST TENTH

- ANSWER: 9.2

SO, THE DISTANCE BETWEEN POINTS A AND B IS APPROXIMATELY 9.2 UNITS WHEN ROUNDED TO THE NEAREST TENTH.

PRACTICAL APPLICATIONS OF FINDING THE DISTANCE BETWEEN POINTS

UNDERSTANDING HOW TO FIND THE DISTANCE BETWEEN POINTS IS MORE THAN AN ACADEMIC EXERCISE—IT HAS REAL-WORLD APPLICATIONS IN VARIOUS FIELDS:

- NAVIGATION AND GPS: DETERMINING THE SHORTEST PATH BETWEEN TWO LOCATIONS ON A MAP.
- COMPUTER GRAPHICS: CALCULATING DISTANCES BETWEEN PIXELS OR OBJECTS.
- ENGINEERING: DESIGNING COMPONENTS AND STRUCTURES WITH PRECISE MEASUREMENTS.
- PHYSICS: CALCULATING DISPLACEMENT OR MOVEMENT BETWEEN TWO POINTS.
- ROBOTICS: PATH PLANNING AND OBSTACLE AVOIDANCE.

BY MASTERING THIS CALCULATION, YOU CAN ANALYZE SPATIAL RELATIONSHIPS EFFICIENTLY AND ACCURATELY.

TIPS FOR ACCURATE DISTANCE CALCULATION

TO ENSURE PRECISION WHEN CALCULATING THE DISTANCE BETWEEN POINTS, CONSIDER THE FOLLOWING TIPS:

- ALWAYS DOUBLE-CHECK COORDINATE INPUTS FOR ACCURACY.
- USE A CALCULATOR FOR SQUARE ROOTS AND ENSURE YOUR CALCULATOR IS SET TO THE CORRECT MODE.
- PRACTICE WITH DIFFERENT POINT PAIRS TO BECOME FAMILIAR WITH THE PROCESS.
- WHEN ROUNDING, LOOK AT THE DIGIT IN THE THOUSANDTH PLACE; IF IT IS 5 OR GREATER, ROUND UP.

ADDITIONAL PRACTICE PROBLEMS

ENHANCE YOUR UNDERSTANDING BY ATTEMPTING SIMILAR PROBLEMS:

1. FIND THE DISTANCE BETWEEN POINTS $C = (5, -3)$ AND $D = (-2, 4)$. ROUND YOUR ANSWER TO THE NEAREST TENTH.
2. CALCULATE THE DISTANCE BETWEEN POINTS $P = (0, 0)$ AND $Q = (7, 24)$. ROUND YOUR ANSWER TO THE NEAREST TENTH.
3. DETERMINE THE DISTANCE BETWEEN POINTS $M = (-4, 7)$ AND $N = (3, -2)$. ROUND TO THE NEAREST TENTH.

SOLUTIONS TO THESE PROBLEMS REINFORCE THE APPLICATION OF THE DISTANCE FORMULA AND BUILD CONFIDENCE IN YOUR SPATIAL REASONING.

CONCLUSION

CALCULATING THE DISTANCE BETWEEN TWO POINTS IN A COORDINATE PLANE IS A VITAL SKILL WITH WIDE-RANGING APPLICATIONS. USING THE DISTANCE FORMULA, DERIVED FROM THE PYTHAGOREAN THEOREM, YOU CAN QUICKLY AND ACCURATELY DETERMINE THE STRAIGHT-LINE DISTANCE BETWEEN ANY TWO POINTS.

IN OUR SPECIFIC EXAMPLE, WE FOUND THAT THE DISTANCE BETWEEN POINTS $A = (2, 0)$ AND $B = (0, 9)$ IS APPROXIMATELY 9.2 UNITS, ROUNDED TO THE NEAREST TENTH. MASTERING THIS CALCULATION EMPOWERS YOU TO BETTER UNDERSTAND GEOMETRIC RELATIONSHIPS AND ENHANCES YOUR PROBLEM-SOLVING TOOLKIT IN MATHEMATICS AND BEYOND.

REMEMBER, PRACTICE MAKES PERFECT. KEEP WORKING THROUGH VARIOUS PROBLEMS, AND SOON YOU'LL FIND CALCULATING DISTANCES IN THE COORDINATE PLANE BECOMES SECOND NATURE.

FREQUENTLY ASKED QUESTIONS

HOW DO YOU FIND THE DISTANCE BETWEEN TWO POINTS $A = (2, 0)$ AND $B = (0, 9)$?

USE THE DISTANCE FORMULA: $\sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$.

WHAT IS THE STEP-BY-STEP PROCESS TO CALCULATE THE DISTANCE BETWEEN A(2, 0) AND B(0, 9)?

SUBTRACT THE X-COORDINATES ($0 - 2$), SQUARE THE RESULT, THEN SUBTRACT THE Y-COORDINATES ($9 - 0$), SQUARE THAT, ADD BOTH SQUARES, AND TAKE THE SQUARE ROOT.

WHAT IS THE EXACT DISTANCE BETWEEN POINTS A(2, 0) AND B(0, 9)?

THE DISTANCE IS $\sqrt{[(0 - 2)^2 + (9 - 0)^2]} = \sqrt{[4 + 81]} = \sqrt{85}$.

WHAT IS THE APPROXIMATE DISTANCE BETWEEN A(2, 0) AND B(0, 9) ROUNDED TO THE NEAREST TENTH?

APPROXIMATELY 9.2 UNITS.

WHY DO WE ROUND THE DISTANCE TO THE NEAREST TENTH IN COORDINATE GEOMETRY PROBLEMS?

ROUNDING TO THE NEAREST TENTH PROVIDES A PRECISE YET MANAGEABLE APPROXIMATION SUITABLE FOR MOST PRACTICAL PURPOSES.

CAN THE DISTANCE BETWEEN TWO POINTS BE NEGATIVE?

NO, DISTANCE IS ALWAYS A NON-NEGATIVE VALUE SINCE IT REPRESENTS THE LENGTH OF THE STRAIGHT LINE SEGMENT BETWEEN THE POINTS.

ADDITIONAL RESOURCES

FINDING THE DISTANCE BETWEEN TWO POINTS IN A COORDINATE PLANE IS A FUNDAMENTAL SKILL IN GEOMETRY AND ANALYTICAL MATHEMATICS. IT ALLOWS US TO QUANTIFY THE SEPARATION BETWEEN POINTS BASED ON THEIR POSITIONAL COORDINATES, WHICH HAS PRACTICAL APPLICATIONS ACROSS VARIOUS FIELDS SUCH AS NAVIGATION, ENGINEERING, COMPUTER GRAPHICS, AND PHYSICS. IN THIS ARTICLE, WE WILL EXPLORE THE PROCESS OF CALCULATING THE DISTANCE BETWEEN POINTS $A = (2, 0)$ AND $B = (0, 9)$, PROVIDING A COMPREHENSIVE UNDERSTANDING OF THE UNDERLYING PRINCIPLES, THE STEP-BY-STEP METHODOLOGY, AND THE SIGNIFICANCE OF THE RESULT. WE WILL ALSO EMPHASIZE THE IMPORTANCE OF ROUNDING THE ANSWER TO THE NEAREST TENTH, ENSURING CLARITY AND PRECISION IN NUMERICAL COMMUNICATION.

UNDERSTANDING THE COORDINATES AND THE DISTANCE FORMULA

COORDINATES OF POINTS A AND B

IN THE COORDINATE PLANE, EACH POINT IS REPRESENTED BY AN ORDERED PAIR (x, y) , WHERE:

- X INDICATES THE HORIZONTAL POSITION (DISTANCE ALONG THE X-AXIS),
- Y INDICATES THE VERTICAL POSITION (DISTANCE ALONG THE Y-AXIS).

FOR OUR SPECIFIC POINTS:

- POINT A IS AT $(2, 0)$, MEANING IT IS 2 UNITS ALONG THE X-AXIS AND 0 UNITS ALONG THE Y-AXIS.
- POINT B IS AT $(0, 9)$, INDICATING IT IS AT THE ORIGIN OF THE X-AXIS AND 9 UNITS ALONG THE Y-AXIS.

VISUALIZING THESE POINTS ON THE COORDINATE PLANE HELPS IN UNDERSTANDING THEIR SPATIAL RELATIONSHIP. POINT A IS LOCATED SLIGHTLY TO THE RIGHT OF THE Y-AXIS, ON THE X-AXIS ITSELF, WHILE POINT B IS DIRECTLY ABOVE THE ORIGIN

ALONG THE Y-AXIS.

THE DISTANCE FORMULA

TO CALCULATE THE STRAIGHT-LINE DISTANCE BETWEEN TWO POINTS IN A PLANE, WE USE THE DISTANCE FORMULA, WHICH IS DERIVED FROM THE PYTHAGOREAN THEOREM. THE FORMULA IS:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

WHERE:

- (x_1, y_1) ARE THE COORDINATES OF THE FIRST POINT (A),
- (x_2, y_2) ARE THE COORDINATES OF THE SECOND POINT (B),
- d IS THE DISTANCE BETWEEN THE POINTS.

THIS FORMULA ESSENTIALLY CALCULATES THE HYPOTENUSE OF A RIGHT-ANGLED TRIANGLE FORMED BY THE HORIZONTAL AND VERTICAL DIFFERENCES BETWEEN THE TWO POINTS.

STEP-BY-STEP CALCULATION OF THE DISTANCE

1. IDENTIFY THE COORDINATES

- POINT A: $(x_1, y_1) = (2, 0)$
- POINT B: $(x_2, y_2) = (0, 9)$

2. CALCULATE THE DIFFERENCES

- HORIZONTAL DIFFERENCE: $\Delta x = x_2 - x_1 = 0 - 2 = -2$
- VERTICAL DIFFERENCE: $\Delta y = y_2 - y_1 = 9 - 0 = 9$

NOTE: THE SIGN OF THE DIFFERENCES INDICATES DIRECTION, BUT SINCE WE WILL SQUARE THESE DIFFERENCES, THE SIGNS DO NOT AFFECT THE MAGNITUDE OF THE DISTANCE.

3. SQUARE THE DIFFERENCES

- $(\Delta x)^2 = (-2)^2 = 4$
- $(\Delta y)^2 = 9^2 = 81$

4. SUM THE SQUARES

$$4 + 81 = 85$$

5. TAKE THE SQUARE ROOT

$$d = \sqrt{85}$$

6. CALCULATE THE NUMERICAL VALUE

USING A CALCULATOR,

$$\sqrt{85} \approx 9.219544$$

7. ROUND TO THE NEAREST TENTH

TO ROUND 9.219544 TO THE NEAREST TENTH:

- LOOK AT THE HUNDREDTHS DIGIT: 1
- SINCE 1 IS LESS THAN 5, WE KEEP THE TENTHS DIGIT AS IS.

FINAL ROUNDED DISTANCE: 9.2

THEREFORE, THE DISTANCE BETWEEN POINTS A AND B IS APPROXIMATELY 9.2 UNITS.

IMPLICATIONS OF THE CALCULATED DISTANCE

GEOMETRIC SIGNIFICANCE

THE CALCULATED DISTANCE PROVIDES A PRECISE MEASURE OF HOW FAR APART THE TWO POINTS ARE WITHIN THE COORDINATE PLANE. THIS MEASUREMENT IS ESSENTIAL IN APPLICATIONS WHERE SPATIAL RELATIONSHIPS ARE CRITICAL, SUCH AS:

- DETERMINING THE SHORTEST PATH BETWEEN TWO LOCATIONS,
- ANALYZING GEOMETRIC SHAPES AND THEIR PROPERTIES,
- COMPUTING DISTANCES IN COMPUTER GRAPHICS FOR RENDERING SCENES ACCURATELY.

PRACTICAL APPLICATIONS

- NAVIGATION AND GPS: CALCULATING THE STRAIGHT-LINE DISTANCE BETWEEN TWO GEOGRAPHIC POINTS.
- ENGINEERING: DESIGNING COMPONENTS THAT MUST FIT WITHIN SPECIFIED SPATIAL CONSTRAINTS.
- ROBOTICS: PROGRAMMING AUTONOMOUS MOVEMENT BASED ON POSITIONAL DATA.
- DATA ANALYSIS: QUANTIFYING DIFFERENCES BETWEEN DATA POINTS IN MULTI-DIMENSIONAL DATASETS.

FURTHER CONSIDERATIONS AND RELATED CONCEPTS

ALTERNATIVE METHODS

WHILE THE DISTANCE FORMULA IS THE MOST STRAIGHTFORWARD METHOD FOR TWO POINTS, OTHER APPROACHES MAY BE USED IN DIFFERENT CONTEXTS:

- MANHATTAN DISTANCE: USEFUL IN GRID-BASED PATHFINDING, CALCULATED AS $|x_2 - x_1| + |y_2 - y_1|$.
- VECTOR APPROACH: USING VECTOR SUBTRACTION AND MAGNITUDE CALCULATION FOR MORE COMPLEX SPATIAL ANALYSES.

EXTENDING TO HIGHER DIMENSIONS

THE CONCEPT OF DISTANCE EXTENDS BEYOND TWO DIMENSIONS. IN THREE-DIMENSIONAL SPACE, FOR POINTS (x_1, y_1, z_1) AND (x_2, y_2, z_2) , THE FORMULA BECOMES:

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

THIS EXTENSION IS VITAL IN FIELDS LIKE PHYSICS AND COMPUTER GRAPHICS, WHERE MULTI-DIMENSIONAL DATA IS COMMON.

CONCLUSION: SIGNIFICANCE OF PRECISE CALCULATION AND ROUNDING

THE PROCESS OF CALCULATING THE DISTANCE BETWEEN TWO POINTS, EXEMPLIFIED HERE WITH POINTS A = (2, 0) AND B = (0, 9), DEMONSTRATES THE PRACTICAL APPLICATION OF FUNDAMENTAL GEOMETRIC PRINCIPLES. THE USE OF THE DISTANCE FORMULA ROOTED IN THE PYTHAGOREAN THEOREM PROVIDES AN EXACT MEASURE, WHICH IS THEN ROUNDED TO THE NEAREST TENTH TO FACILITATE CLEAR COMMUNICATION AND PRACTICAL USABILITY. THE RESULTING APPROXIMATE DISTANCE OF 9.2 UNITS ENCAPSULATES THE SPATIAL RELATIONSHIP BETWEEN THE POINTS, SERVING AS A CRITICAL FACTOR IN NUMEROUS REAL-WORLD APPLICATIONS.

UNDERSTANDING THIS CALCULATION NOT ONLY ENHANCES ONE'S GRASP OF COORDINATE GEOMETRY BUT ALSO UNDERSCORES THE IMPORTANCE OF PRECISION AND CLARITY IN MATHEMATICAL COMPUTATIONS. WHETHER IN ACADEMIC SETTINGS, ENGINEERING PROJECTS, OR NAVIGATION TASKS, MASTERING THE DISTANCE FORMULA AND ITS APPLICATION EMPOWERS INDIVIDUALS TO ANALYZE AND INTERPRET SPATIAL DATA EFFECTIVELY.

6 Find The Distance Between Points A 2 0 And B 0 9 Round Your Answer To The Nearesttenth

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